

ACCESSION NR: - AP3008085

Ye. I. Yelagina, N. Kh. Abrikosov. Synthesis and investigation of rhenium silicide.

G. P. Shveykin and others. Kinetics of niobium oxycarbide decomposition in vacuum, interaction of niobium and carbon monoxide, etc., in connection with the development of the carbothermal method of extraction of niobium from its oxides.

L. A. Nisel'son and others. Obtaining niobium, tantalum, and their alloys by reduction of gaseous chlorides with hydrogen on a heated surface.

G. V. Samsonov, S. N. L'vov, V. N. Paderno. Obtaining ZrC, HfC, NbC, and TaC solid solutions by hot compacting of mixtures of oxides with carbon.

V. F. Funke, V. I. Pshenichnyy. Study of conditions of obtaining TiC, ZrC, and VC from oxides.

V. N. Bondarev. Investigation of synthesis of transition-metal

Card 4/11

L 13408-63 EWP(q)/BDS/EWT(m) AFFTC/ASD JD/JG

ACCESSION NR: AP3000111

S/0126/63/015/004/0631/0633

AUTHOR: Marchenko, V. I.; Samsonov, G. V.

60
58

TITLE: Thermal properties of certain lanthanide sulfides

SOURCE: Fizika metallov i metallovedeniye, v. 15, no. 4, 1963, 631-633

TOPIC TAGS: lanthanide sulfide, thermal property, rare earths monosulfide, sesquisulfide, cerium, praseodymium, neodymium

ABSTRACT: The thermal expansion coefficients of lanthanum, cerium, praseodymium and neodymium mono- and sesquisulfides have been determined experimentally. The composition of baked polycrystalline samples of lanthanum and cerium was practically stoichiometric, while that of praseodymium and neodymium had a somewhat lower sulfur content. The relative sample dilation was measured with a quartz dilatometer in the temperature interval 20-1020C, using argon as a protective medium. The results obtained showed an increase in the thermal expansion coefficient with an increase in the atomic number of the metallic component. The coefficients decreased during the transition from the mono- to sesquisulfide state. This is explained by a greater hardness of the covalent bonds in $Me_{sub 2}S_{sub 3}$ compared to the metallic bonds in MeS . The expected increase in the melting-point

Card 1/2

L 13408-63

ACCESSION NR: AP3000111

temperature with the decrease in the thermal expansion coefficient (at the transition from MeS to Me sub 2 S sub 3) was not observed. The authors conclude that thermal properties of sulfides of the rare earth metals are determined by the amount of covalent bonds S-S in their crystalline lattices. Orig. art. has: 1 table. 2

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov AN UkrSSR
(Institute of Powder Metallurgy and Special Alloys, Academy of Sciences UkrSSR)

SUBMITTED: 03Sep62

DATE ACQ: 12Jun63

ENCL: 00

SUB CODE: 00

NO REF SOV: 003

OTHER: 007

Card 2/2

SAMSONOV, G.V.; DUBROVSKAYA, G.D.

Production of certain thorium sulfides by the interaction of ThO_2 with hydrogen sulfide. Atom. energ. 15 no.5:428-430 N '63. (MIRA 16:12)

L 15557-63

EWP(q)/EWT(m)/BDS AFFTC/ASD JD

ACCESSION NR: AP3002855

S/0126/63/015/006/0940/0941

AUTHORS: Kovenskiy, I. I.; Samsonov, G. V.

TITLE: Electrical resistivity of some transition metals at high temperatures

SOURCE: Fizika metallov i metallovedeniye, v. 15, no. 6, 1963, 940-941

TOPIC TAGS: transition metal, electrical resistivity, high temperature

ABSTRACT: The electrical conductivities of six transition metals were measured and compared. The samples were in the form of wires. Their composition was:

- 1) 99.86% Ni with C, Co, Cu, Si, Fe, S;
- 2) 99.82% Co with C, Ni, Mn, Cu, S, Fe;
- 3) 99.34% Fe with C, Mn, Si, S, P;
- 4) 99.86% Ti with C, W, Ni, Nb, Ta, Zr, Cr, O;
- 5) 99.78% Ta with C, Nb, W, Mg, Mo, Ni, Ti;
- 6) 99.86% W with C, Cu, Zn, Fe, Si, S, P, O.

Electrical current was passed through the wires in an argon atmosphere. During the experiments the temperature varied from 600 to 1400C. The thermal coeffi-

Cord 1/2

L 15557-63

ACCESSION NR: AP3002855

cients of electrical conductivity were calculated by the least square method. They were ($10^2 \mu\text{ohm/cm/degree}$): Fe- 4.79; Co- 4.29; Ni- 3.69; Ti- 4.88; Ta- 3.73, and W- 2.98. It was proved that the relation of temperature to electrical conductivity is linear. The results showed that the magnitude of thermal coefficient and electrical resistivity decreases at the transition from iron to cobalt to nickel and from titanium to tantalum to tungsten. This was explained by the lowered accepting capacity of the d-electron levels of the metals in this series and by the relation of the free path of electrons to the accepting capacity magnitude of the corresponding metals. Orig. art. has: 2 figures.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov AN UkrSSR (Institute of Powder Metallurgy and Special Alloys, Academy of Sciences, Ukrainian SSR)

SUBMITTED: 27Nov62

DATE ACQ: 23Jul63

ENCL: 00

SUB CODE: ML

NO REF SOV: 008

OTHER: 000

Card 2/2

ACCESSION NR: AP/000938/

s/0126/63/016/006/0904/0907

AUTHORS: Samsonov, G. V.; Kovenskiy, I. I.

TITLE: The state of carbon in the carbides of transition metals

SOURCE: Fizika metallov i metallovedeniye, v. 16, no. 6, 1963, 904-907

TOPIC TAGS: titanium, titanium carbide, tantalum, tantalum carbide, tungsten, tungsten carbide, iron, iron carbide, cobalt, cobalt carbide, nickel, nickel carbide, transition metal, carbide physical property

ABSTRACT: The magnitude and the sign of the charges on carbon ions in solid alloys (on Ti, Ta, W, Fe, Co and Ni base) were calculated from the experimental data. It was desired to find the correlation between these values and certain physical properties of the corresponding carbides. It was determined that C atoms in these metals were ionized positively, i.e., the metallic bonds prevailed between the metal and C atoms. It was also established that: 1) the magnitude of C charge in W was much smaller than that in Ti and Ta. This was explained by the nature of statistical electron redistribution; 2) in the series Fe-Co-Ni the C charge decreased with the increased filling of the vacancies in the atomic 3d-levels of these metals; 3) the amount of heat generated during the formation of carbides decreased from Ti to

Card 1/2

ACCESSION NR: AP4009384

Ta and was negative for W. The instability of W carbides was explained by the tendency to dissolve in the carbides of the IV and V groups which have cubic lattices. The variation in the amount of heat generated during the formation of Fe and Ni carbides followed the identical pattern; 3) the energy of the interatomic reaction was lowered during the transition from Ti carbide to carbides of Ta and W. This proved that the vacancies in the d-shell of the metal atoms played a decisive role in the electron structure of carbides. The authors conclude that the process of charge variation of carbon atoms which enter solid solutions is similar to that of carbon atoms forming corresponding carbides. Orig. art. has: 1 table.

ASSOCIATION: Institut metallokeramik i spetsial'nykh splavov AN UkrSSR (Institute of Metal Ceramics and Special Alloys AN UkrSSR)

SUBMITTED: 04Feb63

DATE ACQ: 03Feb64

ENCL: 00

SUB CODE: ML

NO REF SOV: 008

OTHER: 002

Card 2/2

SAMSONOV, G.V.; MOSKVICHEV, B.V.

Thermodynamics of the selective sorption of calcium on carboxyl
cation exchangers. Koll.zhur. 25 no.3:366-369, My-Je '63. (MIRA 17:10)

1. Institut vysokomolekulyarnykh soyedineniy, Leningrad.

SAMSONOV, G.V.; GLIKINA, M.V.; GUDKIN, L.R.; MOROZOVA, A.D.

Catalytic transformations of polypeptides on ion exchange
resins. Biokhimiia 28 no.6:1035-1040 N-D'63 (MIRA 17:1)

1. Institute of High-Molecular Compounds, Academy of Sciences
of the U.S.S.R., Leningrad.

LYUTAYA, M.D.; SAMSONOV, G.V.

Preparation and properties of lanthanum nitride. Ukr.khim.zhur. 29:
251-255 '63. (MIRA 16:4)

1. Institut metallokeramiki i spetsial'nykh splavov AN UkrSSR.
(Lanthanum compounds) (Nitrides)

SAMSONOV, G.V.; KISLYY, P.S.; VLASOV, K.R.

Extrusion of protective sheaths for thermocouples. Ogneupory
28 no.7:311-312 '63. (MIRA 16:9)

1. Institut metallokeramiki i spetsial'nykh splavov AN UkrSSR.

L 18377-63

EWP(q)/EWT(m)/BDS AFFTC/ASD Pad WH/JD/JW/JG/WB

ACCESSION NR: AP3005003

S/0073/63/029/008/0876/0878

AUTHOR: Serebryakova, T. I.; Samsonov, G. V.

TITLE: Borothermic method for preparing boriden ¹

SOURCE: Ukrainskiy khimicheskiy zhurnal, v. 29, no. 8, 1963, 876-878

TOPIC TAGS: borothermic method, vacuum, vacuum borothermic method, reduction, refractory, electronics, titanium boride, zirconium boride, chromium boride, TiB_2 , ZrB_2 , CrB_2 , boron, heat of formation, B_2O_2 , boride

ABSTRACT: The vacuum borothermic method (G. V. Samsonov, Yu. B. Paderno, Boridy* redkozemel'nykh metallov, Izd-vo AN USSR, K., 1961; G. V. Samsonov, Yu. B. Paderno, Sov. avt. svid. No. 121561, 1959; G. V. Samsonov, Yu. B. Paderno, T. I. Serebryakova, Tsvet. met., 11, 48 (1959); G. V. Samsonov, T. I. Serebryakova, A. S. Bolgar, Zh. neorg. kh., 6, 2243 (1961)) has been used to prepare TiB_2 , ZrB_2 , and CrB_2 by reduction of ~ 98% pure TiO_2 , ZrO_2 , and Cr_2O_3 with ~ 98% pure amorphous boron. The oxides were ignited in air at 700C to remove any organic and volatile impurities and moisture. The starting

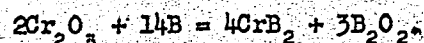
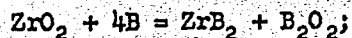
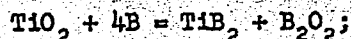
Card 1/82

L 18377-63

ACCESSION NR: AP3005003

0

materials were used in ratios based upon the reactions:



Cylindrical briquets 5—8 mm long and 20 mm in diameter were prepared. The briquets were heated in vacuum to predetermined temperatures in a resistance furnace equipped with a boron-containing graphite heater. Chemical analysis showed that formation of TiB_2 and ZrB_2 begins at 1100C and goes to completion, with stoichiometric end products, at 1600—1700C. Formation of CrB_2 begins at 1200C and goes to completion at 1500C. The carbon content of TiB_2 and ZrB_2 was 0.02—0.1%, and that of CrB_2 , 0.01—0.08%. Carbon can likely be eliminated completely by use of metal or noncarbon-containing heaters. The fact that the heat of formation of B_2O_2 was 91.8—95.4 kcal/mol, or about the same as that given in the literature, confirmed that B_2O_2 is formed rather than boric anhydride. Orig. art. has: 3 figures, 1 table, and 5 formulas.

ASSN: INSTITUTE OF POWDER METALLURGY AND SPECIAL ALLOYS, AN USSR

Card 2/81

L 10493-63

BDS

ACCESSION NR: AP3000651

S/0080/63/036/003/0669/0670

AUTHOR: Samsonov, G. V.; Titkov, Yu. B.

TITLE: Boron phosphide synthesis

SOURCE: Zhurnal prikladnoy khimii, v. 36, no. 3, 1963, 669-670

TOPIC TAGS: boron phosphide, semiconductor, phosphide, flux, thermal stability, x-ray analysis, boron

ABSTRACT: A production process for boron phosphide (BP) powder based on the reaction of PH_3 with B powder has been developed by adapting a process for the synthesis of titanium phosphide. It is noted that BP is a prospective semiconductor. Compound BP was prepared in a quartz reaction tube, purged beforehand for 40 to 50 min with Ar by passing a mixture of PH_3 gas and Ar in a 2/1 ratio over a graphite boat containing amorphous B of 99.7% purity. The reaction tube was heated at 900 to 1100C for 2 to 7 hr and then cooled in a stream of Ar to prevent BP oxidation. The BP yield was 58.20 to 99.74%. The BP was a brown-gray powder having no residual PH_3 odor and not soluble in any solvent,

Card 1/2

L 10493-63

ACCESSION NR: AP30C0651

even after prolonged boiling. To solubilize BP for analytical purposes, it was mixed with an 80- to 100-fold excess of a flux consisting of 4 parts Na_2CO_3 , 4 parts K_2CO_3 , and 1 part KNO_3 heated at 700 to 800C for 10 min to form a melt, which was then dissolved in H_2O . It was found that after heating for 3 to 5 hr at 1100C in a stream of PH_3 , B is almost completely converted into BP with a composition close to the stoichiometric. X-ray analysis of a BP containing 74.18% P and 26.05% B revealed a cubic lattice of the zinc-blende type with $a = 4.538 \text{ \AA}$, a value which coincides with that determined by other investigations. Orig. art. has: 1 table and 1 formula.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov AN USSR
(Institute of Powder Metallurgy and Special Alloys, AN USSR)

SUBMITTED: 06Jan62

DATE ACQ: 12Jun63

ENCL: 00

SUB CODE: CH

NO REF SOV: 003

OTHER: 003

ss/OM
Card 2/2

L 18648-63

EWP(q)/EWT(m)/BDS AFFTC/ASD JD/JG

ACCESSION NR: AP3006178

S/0080/63/036/007/1416/1420

AUTHOR: Samsonov, G. V.; Lyutaya, M. D.

TITLE: Preparation and properties of indium nitride

SOURCE: Zhurnal prikladnoy khimii, v. 36, no. 7, 1963, 1416-1420

TOPIC TAGS: indium nitride, synthesis, indium nitride synthesis, indium sesquioxide, In_2O_3 , ammonia, reduction, indium sesquioxide reduction, nitridation, indium sesquioxide nitridation, nitridation temperature, nitridation time, degree of nitridation, ammonium carbonate, breaking-up agent, oxidation, indium nitride oxidation, indium nitride solubility, solubility, indium nitride analysis, analytical method, analysis

ABSTRACT: Indium nitride has been prepared by heating indium oxide (In_2O_3) in a stream of ammonia. Chemical and x-ray analysis of the reaction products showed that the reduction of In_2O_3 with simultaneous nitridation proceeds very slowly at temperatures below 600C; when the temperature is increased to 610C, the degree of nitridation increases sharply. Nitridation for 4 hr at 630C yields a black product whose composition approaches that of InN ; this product

Card 1/2

L 18648-63

ACCESSION NR: AP3006178

2

decomposes at higher temperatures. When the bed depth exceeds a certain limit, the product is nonhomogeneous; therefore, to facilitate penetration of nitrogen deep into the charge, ammonium carbonate was used both to break up the bed and as a reducing-nitriding agent. By nitridation of In_2O_3 for 4 hr at 610C in the presence of a threefold excess of $(\text{NH}_4)_2\text{CO}_3$, an InN almost stoichiometric in composition is produced. InN powder with a particle size of 40–50 μ resists oxidation in air at temperatures up to 300C. It oxidizes readily at higher temperatures, and is converted to In_2O_3 at 600–700C. InN is soluble in concentrated and dilute HNO_3 and HCl and in dilute H_2SO_4 . It dissolves with decomposition in NaOH , but is resistant to cold or boiling water. The following analytical method for InN is proposed: 1) dissolution in dilute (1:1) H_2SO_4 , with subsequent determination of nitrogen by the Kjeldahl method; 2) determination of In by ignition to constant weight of an InN sample for 1–2 hr at 700C. Orig. art. has: 2 figures and 7 tables.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov AN USSR (Institute of Powder Metallurgy and Special Alloys, AN USSR)

SUBMITTED: 17Jan62

DATE ACQ: 25Sep63

ENCL: 00

SUB CODE: CH, MA

NO REF SOV: 002

OTHER: 004

Card 2/2

L 18647-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD/JG
 8/0080/63/036/007/1615/1618
 58
 ACCESSION NR: AP3006187

AUTHOR: Samsonov, G. V.; Dubrovskaya, G. N.

TITLE: Preparation of certain thorium sulfides by reacting thorium oxide with hydrogen sulfide

SOURCE: Zhurnal prikladnoy khimii, v. 36, no. 7, 1963, 1615-1618

TOPIC TAGS: thorium sulfide, semiconductor, thorium sulfide semiconductor, higher thorium sulfide, thorium sulfide preparation, thorium oxide, hydrogen sulfide, reaction temperature, reaction time, $\text{ThS}_{1.7}$, intermediate product, thorium sulfoxide, carbon, carbon effect, lower thorium sulfide

ABSTRACT: The fact that higher thorium sulfides are semiconductors with high thermal stability and refractoriness (2200—2500C) has prompted the development of a production process for these sulfides which requires only readily available starting materials and simple equipment. The process consists in heating 99.8% pure ThO_2 in a stream of dry H_2S in a porcelain or graphite boat. The following were determined from chemical and x-ray analyses of the reaction products: 1) In a porcelain boat the reaction begins at 500—600C, passes through intermediate steps involving the formation of $\text{ThO}_2 + \text{ThOS}$ (at 600—800C) and of ThOS (at

Card 1/2

L 18647-63

ACCESSION NR: AP3006187

900-1000C), and terminates at 1200-1300C with the formation of almost pure $\text{ThS}_{1.7}$. The optimum reaction time is 1-2 hr. 2) In the presence of carbon (graphite boat) the reaction proceeds in several steps. The following products are formed: ThOS , at 800-1000C; products with an S content approaching that of ThS_2 , at 1100-1200C; and finally, ThS_2 , at 1300C. To obtain a pure product in a graphite boat, the reaction must be conducted for 1 hr at 1000C, for 1 hr at 1200C, and for 10 min at 1300C. $\text{ThS}_{1.7}$ and ThS_2 can be used as starting materials in the production of lower thorium sulfides. Orig. art. has: 2 figures and 4 tables.

ASSOCIATION: non:

SUBMITTED: 19Jan62

DATE ACQ: 25Sep63

ENCL: OC

SUB CODE: CH, MA

NO REF SOV: 002

OTHER: 003

Card 2/2

SAMSONOV, G.V.; LYUTAYA, M.D.; NESHPOR, V.S.

Preparation and physicochemical properties of scandium
nitride. Zhur. prikl. khim. 36 no.10:2108-2115 0 '63.

(MIRA 17:1)

1. Institut metallokeramiki i spetsial'nykh splavov AN UkrSSR.

L 39959-65 EWG(j)/EWP(e)/EWT(m)/EWP(w)/EPF(c)/EWP(i)/EPF(n)-2/EWG(m)/
EWA(h)/EPR/T/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWA(c) Pf-4/PT-4/PS-4/Pu-4
ACCESSION NR: AP4006936 JD/WW/JG/AT/WH S/0080/63/036/012/2759/2762

AUTHOR: Samsonov, G. V.; Paderno, V. N.

TITLE: Preparation and properties of certain refractory carbide alloys

SOURCE: Zhurnal prikl. khimii, v. 36, no. 12, 1963, 2759-2762

TOPIC TAGS: carbides, metal carbide, refractory carbide, refractory alloy, refractory ceramic transition metal carbide, zirconium carbide, hafnium carbide, tantalum carbide, alloyed isomorphous carbide, hafnium carbide, zirconium carbide alloy, tantalum carbide alloy, alloy preparation, powdered alloy sintering, alloy composition, x ray analysis, alloy physical property, refractory material

ABSTRACT: A study was made on the conditions necessary for preparation of solid solutions of zirconium, hafnium, niobium and tantalum carbides by reduction of the corresponding metallic oxides with carbon in a hydrogen medium and in vacuum with simultaneous hot pressing of the reduction products. Carbon coreduction of the metallic oxides with simultaneous hot pressing

Card 1/2

L 39959-65

ACCESSION NR: AP4006936

was effected in graphite molds. Reduced products are a homogeneous solid solution of carbides, indicating the activating role of pressure on the powder during the sintering and homogenizing processes. Samples obtained have a high porosity (up to 25%) due to gas emission. The most dense samples (residual porosity of the order of 2 to 5%) are obtained for zirconium carbide and hafnium carbide alloys by sintering with hot pressing of the powder at 2900C, and for hafnium carbide and tantalum carbide alloys at 3000C (for 10 minutes with pressure on the powder of 320 kg/cm²). Analysis of some physical properties showed that carbide alloys, being homogeneous solid solutions, possess higher indices in comparison with separate carbides, and can satisfy high-temperature requirements. Orig. art. has: 2 figures and 2 tables.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov AN UkrSSR
(Institute of Metal Ceramics and Special Alloys, AN UkrSSR)

SUBMITTED 15Jun62

ENCL: 00

SUB CODE: MM, MT

NO REF: 008

OTHER: 010

Card 2/2 10

SAMSONOV, G.V.; KUZNETSOVA, N.P.; PONOMAREVA, R.B.; PIROGOV, V.S.;
SELEZNEVA, A.A.; VAN-T-GUAN [Wang I-kuang]

Additional sorption interaction in the absorption by ion
exchange resins of organic substances containing peptide and
amides groupings. Zhur.fiz.khim. 37 no.2:280-283 F '63.

(Penicillin)

(Ion exchange resins)

(MIRA 16'5)

(Sorption)

SAMSONOV, G.V.; VEDENEYEVA, V.V.; SELEZNEVA, A.A.; VOYKHANSKAYA, E.Ye.

Ion exchange on anion exchangers involving penicillin. Zhur.
fiz. khim. 37 no.4:725-729 Ap '63. (MIRA 17:7)

1. Leningradskiy khimiko-farmatsevticheskiy institut.

AID Nr. 984-7 6 June *SAMSONOV, G. V.*
 SUPERCONDUCTIVITY OF GALLIUM NITRIDE (USSR)

Alekseyevskiy, N. Ye., G. V. Samsonov, and O. I. Shulishova. Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 44, no. 4, Apr 1963, 1413-1415.
 S/056/63/044/004/041/044

Gallium nitride superconductivity is reported as the first instance of nitride superconductivity other than that of transition-metal nitrides. Gallium nitride and indium nitride samples were prepared with precisely stoichiometric composition and oxygen impurities and were tested in powder form for superconductivity. To determine the dependence of critical field on temperature, the magnetic moment of the samples was measured at several constant temperature values as a function of magnetic field. The indium nitride samples showed no superconductive properties at temperatures down to 1.38°K, while pure gallium nitride exhibited superconductivity below critical temperature of 5.85°K. With increased oxygen impurity, the critical temperature fell sharply to below 1.38°K. In contrast to nitrides of transition metals, GaN samples have the same critical temperature regardless of the method of preparation and have a narrow hysteresis loop of dependence of magnetic moment on external field, similar to that of pure metals.

[BB]

Card 1/1

SAMSONOV, G.V.; MARCHENKO, V.I.

Electrophysical properties of lanthanum and cerium sesquisulfides.
Dokl. AN SSSR 152 no.3:671-673 S '63. (MIRA 16:12)

1. Institut metallokeramiki i spetsial'nykh splavov AN UkrSSR.
Predstavleno akademikom A.P.Aleksandrovym.

FOMENKO, Vladlen Stepanovich; SAMSONOV, G.V., red.; KILLEROG,
N.M., red

[Emissive characteristics of chemical elements and their
compounds; a manual] Emissionnye svoistva khimicheskikh
elementov i ikh soedinenii; spravochnik. Kiev, Naukova
dumka, 1964. 101 p. (MIRA 17:11)

1. Chlen-korrespondent AN Ukr.SSR (for Samsonov).

SAMSONOV, G.V., otv. red.; OBOLONCHIK, V.A., kand. khim. nauk,
red.; VORONOVA, N.A., doktor tekhn. nauk, red.;
GILELAKH, V.I., red.

[Rare and rare-earth elements in technology] Redkie i
redkozemel'nye elementy v tekhnike. Kiev, Naukova dumka,
1964. 129 p. (MIRA 17:9)

1. Akademiya nauk URSS, Kiev. Instytut problem materialo-
znavstva. 2. Chlen-korrespondent AN Ukr.SSR i Institut problem mate-
rialovedeniya AN Ukr.SSR (for Obolonchik). 3. Institut problem ma-
terialovedeniya AN Ukr.SSR (for Samsonov).

L 44549-65 EPF(n)-2/EPR/EWT(m)/EWP(b)/EWG(m)/T/EWA(d)/EWP(w)/EWP(t)

Ps-4/Fu-4 ISP/c WW/JD/JG

ACCESSION NR AM5012945

BOOK EXPLOITATION

UR/

61-
59
271

Zelikman, Abram Naumovich; Kreyn, Ol'ga YE'imovna; Samsonov, Grigoriy
Valentinovich

Metallurgy of rare metals (Metallurgiya redkikh metallov) 2d ed., rev. and enl.
Moscow, Izd-vo Metallurgiya, 64. 0568 p. illus., biblio. Textbook for technical schools of non ferrous metallurgy. Errata slip inserted. 4,185 copies printed.

TOPIC TAGS: rare earth metal, ²¹trace metal, metallurgical process, physical metallurgy, metal property, tungsten, molybdenum, tantalum, ²⁷niobium, titanium, zirconium, germanium, indium, thallium, rhenium, beryllium, lithium

PURPOSE AND COVERAGE: The book offers a description of production processes of the most important rare metals, such as tungsten, molybdenum, rhenium, tantalum and niobium, zirconium, titanium, rare-earth metals, gallium, indium, thallium, germanium, beryllium, lithium. The discussion of each metal includes a description of its physical and mechanical properties, applications, basic methods of obtaining chemical compounds from various types of new material and the production technology of pure metals. The book is intended as a textbook for students of metallurgical technical schools and may serve as an aid for engineer-
Card 1/2

L 44549-65
ACCESSION NR AM5012945

2

ing and technical personnel of the rare-metal industry.

TABLE OF CONTENTS (abridged):

Foreword	— 11
Introduction	— 13
Sect. I Refractory metals	— 25
Sect. II Rare-earth metals	— 322
Sect. III Trace metals	— 372
Sect. IV Light rare metals	— 484
Bibliography	— 597

SUBMITTED: 30Sep64

SUB CODE: MM

NO REF SOV: 197

OTHER: 076

2502
Card 2/2

SAMSONOV, Grigoriy Valentinovich; EPIK, Aleksey Pavlovich.

[Coatings of high melting compounds] Pokrytiia iz tugo-
plavkikh soedinenii. Moskva, Metallurgiya, 1964. 107 p.
(MIRA 17:9)

L 26076-65 EPP(n)-2/EFB/EWT(m)/EPA(bb)-2/EWP(b)/EWP(e)/EWP(t)/ Ps-L/Pu-L
 IJP(g)/ESD(gs)/SSD/AFWL/ESD(t) AT/WH/JD/JG/MNK
 ACCESSION NR AM4049799 BOOK EXPLOITATION S/

Samsonov, G. V.

²⁷ Refractory compounds of rare-earth metals with nonmetals (Tugoplavkiye ²⁷ *soyedineniya redkozemel'nykh metallov s nemetallami*), Moscow, Izd-vo "Metallurgiya", 1964, 242 p. illus., biblio. 2,430 copies printed. *Bt/*

TOPIC TAGS: refractory compound, rare earth metal boride, rare earth metal carbide, rare earth metal nitride, rare earth metal silicide, rare earth metal sulfide, scandium, yttrium, lanthanum, cerium, praesodymium, neodymium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutecium

PURPOSE AND COVERAGE: This book gives the first data on the little-studied class of refractory and hard compounds of rare earth metals (scandium, yttrium, lanthanum, cerium, praesodymium, neodymium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, and lutecium) with boron, carbon, nitrogen, silicon, and sulphur. There is detailed data on the physical-chemical properties, crystal and electron structures of borides, carbides, nitrides, silicides, and sulfides of rare earth metals, methods of making them, and their use in technology and research. The book is intended for researchers and engineers of various fields of metallurgy, *Cord 1/2*

L 20076-65

ACCESSION NR AM4049799

chemistry, physics, crystallochemistry, electronics and can also be useful to graduate and advanced students of higher educational institutions.

TABLE OF CONTENTS [abridged]:

Foreword -- 3

Introduction -- 5

Ch. I. Rare earth metal borides -- 27

Ch. II. Rare earth metal carbides -- 98

Ch. III. Rare earth metal nitrides -- 133

Ch. IV. Rare earth metal silicides -- 156

Ch. V. Rare earth metal sulfides -- 186

SUB CODE: MM

SUBMITTED: 25 Apr 64

NR REF SOV: 0185

CIPHER: 0241

Card 2/2

REPKIN, Yuriy Dmitriyevich; SAMSONOV, G.V., otv. red.; GILELAKH,
V.I., red.

[Precipitation hardened, heat-resistant ceramic metal
SAP-type (sintered aluminum powder) alloys] Metalloke-
ramicheskie dispersionno-uprochnennyye zharoprochnyye
splavy tipa SAP. Kiev, Izd-vo AN USSR, 1964. 70 p.
(MIRA 17:5)

1. Chlen-korrespondent AN Ukr.SSR (for Samsonov).

L 13249-65 EWP(e)/EWT(n)/EPF(n)-2/EPH/EWP(t)/EWP(k)/EWP(b) PT-1/Ps-1/Pu-1
ASD(a)-5/AS(mp)-2/ESD(t) JD/JW/JG/AT/WH

ACCESSION NR: AT4046754

(S) Z/0000/64/000/000/0027/0038

AUTHOR: Semsonov, G. V.

TITLE: Activated sintering of refractory compounds

SOURCE: Medzinarodna konferencia o praskovej metalurgii. 1st, 1962. Problemy praskovej metalurgie; sbornik vedeckych prac (Problems in powder metallurgy: collection of scientific papers). Bratislava, Vyd-vo SAV, 1964, 27-38

TOPIC TAGS: special atmosphere, hot pressing, electron structure, activation mechanism, metallic additive, chloride additive

ABSTRACT: The author discusses the following variants of activating the sintering of refractory compounds: reaction sintering, sintering activated by metallic additives, the creation of certain special atmospheres utilizing gas-forming admixtures, and hot pressing. In the case of reaction sintering of refractory-metal nitrides the author quotes the effect of the electron structure, formed during the sintering phase, on the activation of the sintering process. The author also discusses the activation mechanism applied during sintering and by

1/2

L-13249-65

ACCESSION NR: AT4046754

the introduction of metallic and chloride additives. He explains the nature of activated sintering by applying pressure. Orig. art. has: 3 tables and 4 figures.

ASSOCIATION: Institut metallorozivki i special'nykh splavov AN UkrSSR, Kiev
(Institute of Powder Metallurgy and Special Alloys, AN, UkrSSR) of Sciences,

SUBMITTED: 00

ENCL: 00

SUB CODE: M4, IC

NO REF SOV: 020

OTHER: 002

L 15292-65 EWP(e)/EPA(e)-2/EWT(m)/EPT(o)/EPF(n)-2/EWA(d)/EPR/EPA(w)-2/
T-2/EWP(t)/EWP(k)/EWP(b) : Pf-4/Pab-10/Pr-4/PS-4/Pt-10/Pu-4 BSD/ASD(m)-3
JD/WW/JG/MLK/AT/WH
ACCESSION NR: AT4045966 S/0000/64/000/000/0108/0117

AUTHOR: Samsonov, G. V.

TITLE: Some trends in the creation of new types of metal powder alloys

SOURCE: Novyye materialy* v mashinostroyeni (New materials in machinery manufacturing). Moscow, Izd-vo Mashinostroyeniye, 1964, 108-117

TOPIC TAGS: powder metallurgy, powder alloy; metal powder alloy, cermet, carbide, carbide alloy, refractory alloy

ABSTRACT: In this review of the composition, structure and properties of the new carbide alloys, two principal directions are indicated for future attempts to increase the quality of such alloys. The first development, which might increase the cutting strength of a tool by 5-15%, could be accomplished in a short time and consists of: (1) Increasing the hardness (and wear resistance) of the carbide component by using complex solid solutions of carbides (the maximum hardness values for various binary solid solutions of carbides are tabulated); (2) decreasing the tendency of carbide grains to break out during cutting by trying to obtain higher cohesion between the carbides and the cementing metal (which depends on the wetting properties in the liquid state); this has been obtained by adding molybdenum and tungsten carbides, although another way is addition of components such as tungsten

Card 1/3

L 15292-65

ACCESSION NR: AT4045966

and molybdenum, and possibly vanadium, zirconium, columbium, and tantalum to the cementing metal (cobalt); (3) replacing the carbide component by other quasi-metallic compounds, primarily by borides; however, the tendency of borides to interact with the cementing metal presents difficulties, and the wetting of borides by the molten cementing metal is considerably inferior to that of carbides. So far, maximum hardness values have been obtained in a complex system of titanium, zirconium, and tungsten borides (on the order of $4000-4500 \text{ kg/mm}^2$), but similar hardness can be obtained by addition of hafnium carbide, which will probably be technologically simpler. Some theoretical interest is currently attached to the use of nitrides of refractory metals, since the use of silicides has proven to be unsatisfactory. The second visualized development aims at a more basic improvement in the cutting properties and other operational characteristics of alloys (possibly by several hundred percent). Such progress is expected from the use of boron carbide (B_4C), some alloys of the system boron-silicon-carbon, the boron-cubic modification of boron nitride (i.e. compounds with $H_m = 5000-7000 \text{ kg/mm}^2$), and diamond ($H_m = 8000-10000 \text{ kg/mm}^2$). However, all these compounds have poor wetting properties and cannot be recrystallized through molten metals due to the character of their electronic structure and chemical bonds. Development of methods for the preparation of finely dispersed solid particles, as well as methods for strengthening the bonds between the solid particles and the carrier metal, will permit a sharp increase in the quality of hard alloys. Another possibility

Card 2/3

L 15292-65

ACCESSION NR: AT4045966

is the use of metal powder alloys, particularly those which have good wetting properties with molten metals and are able to recrystallize through them.
Orig. art. has: 3 figures and 1 table.

ASSOCIATION: none

SUBMITTED: 16May64

ENCL: 00

SUB CODE: MM

NO REF SOV: 025

OTHER: 005

Card 3/3

L 13981-65 EWP(e)/EWT(m)/EPF(c)/EPF(n)-2/EPR/EWP(b) Pr-L/Pr-L/Pu-L ESD(gs)
 JD/JG/MLK/AT/WH S/0000/64/000/000/0118/0126
 ACCESSION NR: AT4047135

AUTHOR: Lyutaya, M. D.; Samsonov, G. V.

TITLE: Nitrides of rare dispersed and rare-earth metals ✓ 5

SOURCE: AN UkrSSR. Institut problem materialovedeniya. Redkiye i redkozemel'ny*ye elementy* v tekhnike (Rare and rare earth elements in engineering). Kiev, Naukova dumka, 1964, 118-126

TOPIC TAGS: rare metal, rare earth metal, rare metal nitride, rare earth metal nitride, gallium nitride, indium nitride, scandium nitride, lanthanum nitride, cerium nitride ✓ ✓

ABSTRACT: Nearly pure gallium nitride was obtained by the treatment of gallium metal (mixed with ammonium carbonate for greater permeability) with nitrogen at 1100C. The nitride obtained resists oxidation at temperatures up to 700C. It also resists concentrated boiling sulfuric, nitric, and hydrochloric acids, but dissolves completely in boiling alkali solutions. The reduction of indium sesquioxide with ammonia at 620—630C produces a nitride containing 10.73% nitrogen as compared to stoichiometric 10.87% nitrogen. Indium nitride decomposes

Card 1/2

L 13981-65

ACCESSION NR: AT4047135

in air at 350C and dissolves in mineral acids and in alkali solutions. $\text{ScN}_{0.97}$ was obtained by the reduction of scandium oxide with carbon black in a nitrogen atmosphere. This nitride resists oxidation in air at temperatures up to 600C. It resists all but nitric acid at room temperature, but decomposes in boiling acid and alkali solutions. Lanthanum and cerium nitrides were synthesized by treatment with ammonia at 600C. In both cases, nitrides of stoichiometric composition were obtained. Orig. art. has: 5 figures and 5 tables.

ASSOCIATION: Institut problem materialovedeniya AN UkrSSR (Institute of Material-Science Problems, AN UkrSSR)

SUBMITTED: 08Jun64

ENCL: 00

SUB CODE: MM, GO

NO REF SOV: 002

OTHER: 011

ATD PRESS: 3137

Card 2/2

I 9954 65 EWT(m)/EDF(n)-2/EPB/T/ENP(b) Ps-4/Pu-4 AFMDC/ASD(F)-2/AS(mp)-2/
 ASD(m)-3 JD/WH/JW/JG/MLK/AT/WH
 ACCESSION NR: AT4046831 S/0000/64/000/000/0132/0139

AUTHOR: Samsonov, G. V., Epik, A. P.

TITLE: Investigation of the conditions of surface saturation of heat resistant transition metals by carbon and boron

SOURCE: AN SSSR. Nauchnyy sovet po probleme zharoprochnykh splavov. Issledovaniya staley i splavov (Studies on steels and alloys). Moscow, Izd-vo Nauka, 1964, 132-139

TOPIC TAGS: metal diffusion, titanium, zirconium, niobium, tungsten, molybdenum, carbon diffusion, boron diffusion, transition metal, refractory metal, metal surface saturation

ABSTRACT: Diffusion saturation of metals and alloys with different elements is not only effective, but is in some cases the only way of obtaining parts with certain physical, chemical and mechanical properties in the surface layer. The present paper describes further investigations of the process of diffusion saturation of titanium, zirconium, molybdenum and tungsten by carbon and niobium, and of tantalum by boron. Cylindrical samples were used, obtained by turning metal

1/3

Card

L 9954-65

ACCESSION NR: AT4046831

rods containing at least 99.8% pure metal (except for tantalum which contained 99.6% Ta and 0.4% Nb). Lamp black heated at 700-800C for 2 hours and containing not over 0.2% ash was used for carbide-facing, while a compound of boron and borax (84:16 by weight) was used for boron saturation. The process was carried out in Tamman furnaces. The Nb, Ta, Mo and W were saturated with boron at 1100-1400C, Ti and Zr at 1100-1500C. The Ti and Zr were saturated with carbon at 900-1300C, molybdenum at 1400-1700C and tungsten at 1600-1900C. X-ray, chemical and metallographic analyses were made after saturation. These tests showed that the W_2C layer increased sharply with time and increasing temperature, while the WC layer increased very slowly. A satisfactory bond with the pure metal is observed with layers not thicker than 50-70 microns. The micro-hardness of W_2C and Mo_2C layers obtained at maximum saturation temperatures was 1650-1780 and 1420-1500 kg/mm² respectively. The carbide layers obtained on titanium and zirconium at 900-1000C in the course of 1-8 hours were dense, without cracks and properly bonded with the pure metal. An increase in the carbide-facing temperature led to higher layer hardness, but with lower density, higher porosity, lower bonding, higher brittleness and the appearance of cracks. The higher hardness may be explained by the wider range of homogeneity of the TiC and ZrC phases, as well as by the increase in the

Card

2/3

L 9954-63

ACCESSION NR: AT4046831

carbon content. The boride layers are much more closely bound to the pure metal than the carbide layers, due to the waves on the boundary between the metal and the inner boride layer, caused in turn by boron diffusion along the grain boundaries. The adhesion between the inner and outer boron layers, however, is lower than that between boron and metal. The microhardness of the inner layers amounts to 2320-2460 kg/mm² on tungsten, and 2450-2580 kg/mm² on molybdenum; the microhardness of the outer layers was lower. The boride layers on tantalum and niobium were dense, without pores and with good bonding. No cracks were formed in the layers at 1100-1300C. The boride layers on titanium and zirconium were much thinner than on W, Mo, Nb and Ta under similar conditions. Scores made on the surface prior to boron saturation remained after the process. Finally, it was found that the activation energy is related to the ionic potential of the diffusing metal. On the basis of metallographic analysis, the properties become worse with increasing depth of the diffused metal. Orig. art. has: 3 figures and 2 tables.

ASSOCIATION: none

SUBMITTED: 16Jun64

NO REF SOV: 019

ENCL: 00

OTHER: 004

SUB CODE: MM

Card 3/3

L 25034-65 EWT(m)/EWA(d)/T/EWP(t)/EWP(b) IJF(c) JD/JG/WB/MLK

ACCESSION NR: AT4048711

S/0000/64/000/000/0163/0165

AUTHOR: Samsonov, G.V.; Verkhoglyadova, T.S.; Vdovenko, S.A.

TITLE: Chemical compounds of the system scandium-boron and their properties

SOURCE: Vsesoyuznoye soveshchaniye po splavam redkikh metallov, 1963. Voprosy*
teorii i primeneniya redkozemel'nykh metallov (Problems in the theory and use of rare-
earth metals); materialy* soveshchaniya. Moscow, Izd-vo Nauka, 1964, 163-165

TOPIC TAGS: scandium boron system, scandium boride, scandium diboride, scandium
tetraboride, scandium tetraboride resistivity

ABSTRACT: In a continuation of earlier work, detailed studies of the requirements for the
preparation of scandium diboride are reported, as well as a search for phases of other
possible compositions (ScB , ScB_4 , ScB_6 , ScB_{12}). ScB_2 was obtained from Sc_2O_3 by re-
duction with B_4C and carbon at 1850 C for 2 hours. Under X-ray, it showed a hexagonal
structure of the AB_2 type. ScB_4 was obtained by adding elemental boron to the above
reaction mixture or by borothermal reduction at only 1700-1800 C ($2\text{Sc}_2\text{O}_3 + 22\text{B} = 4\text{ScB}_4$
 $+ 3\text{B}_2\text{O}_2$). The tetraboride showed a tetragonal lattice. No B_6 or B_{12} compounds were
obtained under these experimental conditions. The physical properties of ScB_2 and ScB_4

Card 1/2

L 25034-65

ACCESSION NR: AT4048711

are reported (resistivity, thermal e.m.f., microhardness, thermal expansion coefficient). ScB_2 was quite resistant to oxidation by air at temperatures up to 700 C. Comparison of the physical properties showed that the crystal lattice of ScB_4 was considerably stronger than that of ScB_2 , due apparently to the frame configuration of the boron atoms which is characteristic for tetraborides. This latter would also cause the high electrical resistance of ScB_4 . The new ScB_4 phase may be of interest for increasing electric resistance and thus simplify the heating of cathodes made of rare earth hexa- or tetraborides. With the latter it should form narrow ranges of solid solutions, owing to its specific crystal structure. Orig. art. has: 8 chemical equations and 2 figures.

ASSOCIATION: none

SUBMITTED: 13Jun64

ENCL: 00

SUB CODE: IC, SS

NO REF SOV: 003

OTHER: 000

Card 2/2

L 25048-65 . EWT(m)/EPR/EWP(t)/EWP(b) Ps-L IJP(c) JD/JG/MLK

ACCESSION NR: AT4048713

S/0000/64/000/000/0172/0176

AUTHOR: Podergin, V.A.; Samsonov, G.V. 21
3+1

TITLE: Thermometallic reduction for preparing the aluminides of rare earth metals,
their properties and fields of application 27 27

SOURCE: Vsesoyuznoye soveshchaniye po splavam redkikh metallov, 1963. Voprosy*
teorii i primeneniya redkozemel'nykh metallov (Problems in the theory and use of rare-
earth metals); materialy* soveshchaniya. Moscow, Izd-vo Nauka, 1964, 172-176

TOPIC TAGS: thermal reduction, rare earth aluminide, rare earth oxide, metal oxide
reduction, aluminum oxidation, aluminum alloy

ABSTRACT: The authors report the results of a study on the thermal reduction by alumi-
num of La_2O_3 , CeO_2 and Pr_6O_{11} to obtain alloys and aluminides of the rare earths. Ex-
perimental reduction was carried out with a mixture of gypsum and aluminum powder of
varying mesh size under normal pressure. To determine the effect of the specific thermal
process on the reduction of La, Ce and Pr oxides, values of 500 - 1650 kcal/kg were
selected from which the charge was calculated. The thermal effect of the reduction re-
action was, e.g., 63.7 kcal/mole La_2O_3 . The process worked best with 800 - 1100 kcal/kg

Card 1/3

L 25248-65

ACCESSION NR: AT4048713

and a fine aluminum powder. The reaction rate was directly proportional to the thermal characteristics of the process and the fineness of the Al powder in the charge; optimal values were 850 kcal/kg for La and Ce oxide and 800 kcal/kg for Pr oxide, with yields of 25-55%. Tests of the same kind conducted at 1000-1600C in a vacuum showed that reduction proceeds with the formation of AlO . In a vacuum, the reduction process starts above 800C, and its rate increases with increasing temperature. Curves characterizing the reduction process of La, for example, showed 2 sharp peaks; the first at 820C had a negative thermal effect with a correspondingly lowered pressure in the reaction space of the furnace, while the second, at 1040C, represented the second stage of oxide reduction; the reaction then continued with a positive thermal effect and a higher intensity. Chemical and X-ray analysis of the reaction products showed that the 2 peaks correspond to partial reduction and aluminate formation, respectively. The reaction was not yet complete at 1700C. An excess of Al considerably increased the reduction process. In this way, aluminides of La and Ce were obtained. The melts of La and Ce with Al thus obtained were used for the modification and alloying of pure Al . Tests showed that such melts, containing 20-30% rare earths, readily dissolve in Al upon slight heating. Orig. art. has: 4 formulas and 3 figures.

Card 2/3

L 25048-65

ACCESSION NR: AT4048713

ASSOCIATION: none

SUBMITTED: 13Jun64

NO REF SOV: 001

ENCL: 00

OTHER: 001

0
SUB CODE: MM,Tb

Card 3/3

LD/C) JD/JG/GS/AT/NH

ACCESSION NR: AT5002778

S/0000/64/000/000/0181/0185

AUTHOR: Samsonov, G. V.; Obolonchik, V. A.; Neshpor, V. S.;
Verkhoglyadova, I. S.; Vereykina, L. L.; Nikhilina, T. I.

32
B#1

TITLE: Synthesis and properties of some refractory rhenium compounds

SOURCE: Vsesoyuznoye soveshchaniye po probleme reniya, 2d. Moscow,
1962. Reniy (Rhenium); trudy soveshchaniya. Moscow, Izd-vo Nauka,
1964, 181-185

TOPIC TAGS: rhenium, rhenium refractory compound, rhenium compound,
rhenium nitride, rhenium silicide, rhenium phosphide, rhenium sele-
nide, physicochemical property, compound synthesis, compound

ABSTRACT: The conditions of synthesis and the physicochemical prop-
erties of several rhenium compounds have been investigated. Re powder
did not react with N at 300—900C. Reaction between Re and ammonia
gas began at 250C, and an Re₂N compound containing 3.5% N was formed
at 600C. NH₄ReO₄ began to react with ammonia gas at 300C with the
N-rich reaction products forming after short exposures. ReSi₂ was
synthesized by sintering a mixture of Re and Si (99.99% pure) powders

Card 1/3

L 41152-65

ACCESSION NR: AT5002778

0

at 3000C for 3 hr. Extrusion of ReSi_2 powder at 1200C yielded solid ReSi_2 with a density of 90% of the theoretical, a hardness of $1500 \pm 40 \text{ kg/mm}^2$, a shear modulus of $(14.7 \pm 0.7) \cdot 10^{-3} \text{ kg/mm}^2$, and a coefficient of thermal expansion of $6.6 \cdot 10^{-6}/\text{deg}$. ReSi_2 has a room temperature resistivity of about 100 ohm-cm. The temperature dependence of thermal emf shows a maximum of about 150 $\mu\text{V}/\text{deg}$ at 400C. The forbidden-zone width is about 0.13 eV. ReSi_2 is a promising high-temperature (m.p., 1980C) semiconductor. With a 30-min exposure in air at 1400C, a thin protective SiO_2 film is formed which effectively inhibits further oxidation of ReSi_2 at temperatures up to 1600—1700C. In the synthesis of Re phosphides by the reaction $\text{Re} + \text{PH}_3 + \text{MeP} + \text{H}_2$ at 800—1100C, the product with the highest P content was obtained with a 3-hr reaction at 900C. The product corresponded to Re_3P compound whose stoichiometric P content is 5.25%. This previously unknown compound appears to be the most stable phase in the Re-P system at atmospheric pressure. ReSe_2 obtained by treating Re powder or NH_4ReO_4 with hydrogen selenide at 700C is a dark gray powder with a density of 8.27 g/cm^3 . It is stable in air and dissolves in hot H_2O_2 and in a mixture of concentrated HNO_3 and H_2SO_4 . It does not dissolve in concentrated HCl , and partially dissolves in hot HNO_3 , H_2SO_4 , and aqua regia. Orig. art. has: 3 figures. [MS]

Card 2/ 3

ACCESSION NR: AP4015267

S/0226/64/000/001/0065/0070

AUTHORS: Bondarev, V. N.; Samsonov, G. V.

TITLE: Production of molybdenum and chromium germanides

SOURCE: Poroshkovaya metallurgiya, no. 1, 1964, 65-70

TOPIC TAGS: molybdenum germanide, chromium germanide, germanium, VCh molybdenum, chromium, electrolytic chromium, TVV oven, OPPIR pyrometer, URS-50I x ray assembly

ABSTRACT: The purpose of this work was to determine optimal conditions for baking the initial materials to be used in obtaining Mo_3Ge and Cr_3Ge with a beta-W lattice. The initial materials were monocrystalline germanium with the specific electrical resistivity 3 ohm cm, molybdenum powder of the type VCh, and electrolytic chromium. Well dried and sieved (0.05 mm mesh), Mo and Ge powders were mixed for 12 hours and pressed into bars 12-14 mm long and 8 mm in diameter. The baking temperature was measured in a TVV-4 oven (under high argon pressure) with an OPPIR pyrometer. The x-ray analysis of the sample structure was made in the URS-50I assembly. The samples were baked at 980, 1000, 1300, 1600, and 1800C for different periods of time. It was established that Mo_3Ge can be obtained by

Card 1/2

ACCESSION NR: APL015267

baking the pressed samples at 1780-1800C for 4 hours. The temperature of the Mo_3Ge melting was 1830-1850C. The compound Cr_3Ge was obtained by a direct melting of the components at 1520-1540C. Orig. art. has: 4 tables.

ASSOCIATION: Institut problem materialovedeniya AN USSR (Institute on the Problems of Materials Science AN UkrSSR); Khimiko-metallurgicheskiy institut SO AN SSSR (Institute of Metallurgy SO AN SSSR)

SUBMITTED: 04Mar63

DATE ACQ: 12Mar64

ENCL: 00

SUB CODE: ML

NO REF SOV: 002

OTHER: 006

Card 2/2

ACCESSION NR: AP4017568

S/0149/64/000/001/0145/0150

AUTHOR: Samsonov, G. V.; Sinel'nikova, V. S.; L'vov, S. N.; Nemchenko, V. F.

TITLE: Physical properties of titanium, zirconium, and vanadium aluminides

SOURCE: IVUZ. Tsvetnaya metallurgiya, no. 1, 1964, 145-150

TOPIC TAGS: titanium alloy, zirconium alloy, vanadium alloy, aluminum alloy, aluminide, physical property, electrical conductivity, thermal conductivity, Hall effect, Wiedemann Franz ratio, thermal expansion, hardness, magnetic susceptibility

ABSTRACT: The physical properties determined were resistivity, thermal coefficient of resistivity, coefficient of thermo-emf, Hall constant effective current carrier mobility, effective current carrier concentration, heat conductivity, Wiedemann Franz ratio, coefficient of thermal expansion, microhardness, and magnetic susceptibility. The alloys $TiAl$, $*TiAl_3$, Zr_3Al , Zr_2Al , $ZrAl_3$, V_5Al_8 , VA_3 , VA_6 , and VA_{11} were prepared by arc melting in argon or by sintering from AV000 aluminum and 99.98% pure iodide titanium, zirconium, and vanadium. The greater hardness, lower resistivity, and lower thermal expansion of $TiAl_3$ compared to $TiAl$ indicate greater electron density in the Ti 3d-electron level. The specific conductivity of Zr-aluminides increases as the ratio of Al:Zr increases.

Card 1/2

ACCESSION NR: AP4017568

which process is linked to a gradual electron influx into the Zr d-level. V-aluminides show a similar pattern. Minimum current carrier concentrations and maximum current carrier mobilities for all $MeAl_3$ alloys are noted. Except for Ti-aluminides, the Wiedemann-Franz ratio for the alloys was found to be greater than theoretical, which is accounted for by significant lattice contributions to the electrical conductivity. From the donor-acceptor theory, it is concluded that the probability of an Al-valence electron influx into the d-level decreases as the accepting ability of the latter decreases in the order $Ti \rightarrow Zr \rightarrow V$. Orig. art. has: 2 figures and 3 tables.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov AN UkrSSR (Institute of Powder Metallurgy and Special Alloys); Khersonskiy pedagogicheskiy institut (Kherson Pedagogical Institute)

SUBMITTED: 19Jul63

SUB CODE: MM

NO REF SOV: 012

ENCL: 00

OTHER: 001

Card ^{2/2}

NESHPOR, V.S.; L'VOV, S.N.; SAMSONOV, G.V.

Magnetic susceptibility of silicides of certain transition metals.
Izv. vys. ucheb. zav.; fiz. no.1:160-163 '64. (MIRA 17:3)

1. Institut metallokeramiki i spetsial'nykh splavov AN UkrSSR i
Khersonskiy pedagogicheskiy institut imeni Krupskoy.

L 2099-65 EWT(m)/EPF(c)/EPF(n)-2/EPR/EWP(j)/EWP(k)/EPA(bb)-2/EWP(q)/EWP(b)
~~Pc-4/Pf-4/Pr-4/Ps-4/Pu-4~~ JD/JG/AT/RM/WH S/0226/64/000/002/0099/0102
 ACCESSION NR: AP4029211

AUTHOR: Samsanov, G. V.; Dubovik, T. V.

TITLE: Technique of manufacturing refractory parts from aluminum nitride

SOURCE: Poroshkovaya metallurgiya, no. 2, 1964, 99-102

TOPIC TAGS: refractory part, refractory, aluminum nitride, aluminum nitride compacting, sintering, aluminum nitride sintering, aluminum nitride extrusion

ABSTRACT: A technique is developed for the manufacture of parts from aluminum nitride by compacting or extrusion of aluminum nitride powder mixed with a plasticizer (a solution of synthetic rubber in gasoline for compacting and a solution of bakelite in alcohol for extrusion of tubes and bars). This is followed by sintering in nitrogen at 1900 ± 50 C; machining if necessary is done prior to sintering. The sintered parts had a melting temperature above 2400 C, a coefficient of thermal expansion of 5.5×10^{-6} , a resistivity of the order of 10^{12} ohm-cm, and a microhardness of the order of 39200 MN/m². Flow sheets for the production of parts, bars, and tubes are presented. Porosity is rather high (12-16%). Articles of simple shape can be made by hot compacting aluminum nitride powder (without plasticizer). Such articles have an almost theoretical density.

Card 1/2

L 2099-65
ACCESSION NR: AP4029211

ASSOCIATION: Institut problem materialovedeniya AN SSSR (Institute for Problems
in the Science of Materials, AN SSSR)

SUBMITTED: 15Apr63

ENCL: 00

SUB CODE: MM, IC

NO REF SOV: 004

OTHER: 000

Card 2/2

ACCESSION NR: AP4021560

S/0136/64/000/003/0059/0062

AUTHOR: Podergin, V. A.; Samsonov, G. V.

TITLE: Aluminothermic Production of Aluminum-Cerium alloys

SOURCE: Tsvetny*ye metally*, no. 3, 1964, 59-62

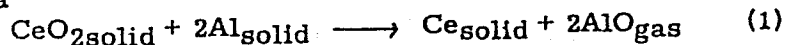
TOPIC TAGS: aluminothermic reduction, cerium, aluminum, vacuum furnace, aluminum cerium alloy

ABSTRACT: In earlier papers N. N. Murach and U. D. Vertyagin [Buepechnaya metallotermiya (Furnace exterior metallotherm), metallurgizdat, 1956] referred to metallothermic reduction of rare-earth metal oxides as the most promising method of alloy production. Since little information is available on this process the authors investigated the aluminothermic reduction of cerium dioxide under a vacuum for the purpose of aluminocerium alloy production. Specimens were heated at 800C for 2 hours. The mixed cerium and aluminum dioxide power was compressed into 15-20 mm high cylindrical rods with an 18 mm diameter. The

Card 1/3

ACCESSION NR: AP4021560

process of reduction was observed in a TVV-34 vacuum furnace with an EPP-09-MI temperature control device. The initial pressure was 10^{-4} mm Hg. Within a temperature range of 1000 to 1600 C volatile aluminum oxide formed according to the formula



Thermal analysis of the CeO_2 -2Al system showed the reduction reaction occurring in three stages, the last being observed at 1070C. Above that temperature, metallic cerium was identified showing that aluminate had been reduced. The reaction is accompanied by a positive heat effect and by the formation of a gaseous product. The color of the rod surfaces makes it possible to evaluate the degree of reduction. At 800-850C they are greenish-yellow turning a deep yellow at higher temperatures and above 1300C surface decomposition is identifiable by a black coloring. Cerium aluminate was detected within the 900-1400C range. The purity of the resulting metallic cerium does not exceed $\pm 5\%$ but can be heightened by using a crucible that does not react with the reduced hot cerium. Tests proved the possibility of producing alloys with the desired composition at 1500C with a two-hour holding period. Above that temperature, the cerium con-

Card 2/3

ACCESSION NR: AP4021560

tent in the alloy decreases. The grain fineness affects reduction and $\pm 0.053\text{mm}$ was found to be the most favorable aluminum powder grain size. Tests showed the best pelletizing pressure to be equal to 150 kg/cm^2 . Unpressed specimens are not fully reduced. Investigations of the microstructure showed that above 1300 C reduction was most complete. After completed reaction the specimens have a metallic appearance, a pipe on top, a smooth and clear surface, and a fine-crystalline fracture. The investigation opens the road for industrial production of aluminum-cerium and other rare-metal alloys. Orig. art. has: 2 figures, 1 table, 2 formulae

ASSOCIATION: None

SUBMITTED: 00

DATE ACQ: 08Apr64

ENCL: 00

SUB CODE: IC, MM

NO REF SOV: 004

OTHER: 003

Card 3/3

L 42965-65 EWP(e)/EWT(m)/T/EWP(t)/EWP(b)/EMA(c) IJP(c) JD/JG
S/0289/64/000/003/0078/0084 25
ACCESSION NR: AP5009426 23

AUTHOR: Samsonov, G.V.; Paderno, Yu. B.; Vaynshteyn, E. Ye.

TITLE: Chemical bonding in rare earth hexaborides 27

SOURCE: AN SSSR. Sibirskoye otdeleniye. Izvestiya. Seriya khimicheskikh nauk, no. 3, 1964, 78-84

TOPIC TAGS: rare earth, rare earth hexaboride, hexaboride structure, hexaboride electromagnetic property, hexaboride physical property

ABSTRACT: The authors discuss the bonding of rare earth hexaborides in terms of the work reported in the literature and their own contributions. The analysis of the structures and properties of the hexaborides reveals their dual nature. On the one hand, their crystal lattice may be regarded as a simple cubic lattice of metal atoms with its center occupied by an octahedron of boron atoms which distort it to some extent; on the other hand, it may be regarded as a simple cubic lattice made up of a group of boron atoms, at the center of which the atoms of the metal are freely distributed. Accordingly, the electric and magnetic properties of the hexaborides, i.e., the properties related to the energy levels of the electrons, are determined by the metal forming the

Card 1/2

L 42965-65

ACCESSION NR: AP5009426

2

hexaboride, and may change substantially from one hexaboride to another. However, the properties due to the normal vibrations of the atomic groups of the lattice (melting point, hardness, etc.) are determined by the rigid structural skeleton consisting of boron atoms and is relatively independent of the particular properties of the metal forming the hexaboride. Orig. art. has: 2 figures and 2 tables.

ASSOCIATION: Institut neorganicheskoy khimii Sibirskogo otdeleniya AN SSSR, Novosibirsk (Institute of Inorganic Chemistry, Siberian Branch, Academy of Sciences of the SSSR); Institut metallokeramiki i spetsstavlavov AN UkrSSR, Kiev (Institute of Powder Metallurgy and Special Alloys, Academy of Sciences of the Ukrainian SSR)

SUBMITTED: 10Jul63

ENCL: 00

SUB CODE: IC

NO REF SOV: 013

OTHER: 012

B/L
Card 2/2

ACCESSION NR: AP4019470

S/0133/64/000/003/0216/0218

AUTHORS: Samsonov, G. V.; Reshetnyak, Yu. S.; Vlasov, K. R.

TITLE: Applying thermocouples encased in zirconium diboride for continuous measurement of liquid metal temperature in an oxygen converter

SOURCE: Stal', no. 3, 1964, 216-218

TOPIC TAGS: thermocouple, chromel-alumel thermocouple, zirconium diboride protective casing, oxygen converter, liquid metal temperature, continuous temperature measurement

ABSTRACT: The chromel-alumel thermocouples clad in three-layer protective casings of ZrB_2 were used for a continuous measurement of liquid metal temperature in a converter during the process of oxygen blowing. The protective casings were 15 mm in diameter and 140-150 mm long, with a wall thickness of 2 mm. The thermocouples were installed in the refractory lining of the converter at different distances from the bottom in such a way that their ends protruded into the converter for 22 to 38 mm. These ends were made of 3 layers, one of alundum, one of ZrB_2 , and one of aluminum oxide powder poured between the other two layers. ZrB_2 was produced by

Card 1/2

ACCESSION NR: AP4019470

mixing fine zirconium diboride powder with a starch glue (140 grams of glue per 1 kg of ZrB_2 powder). The mixture was cooked until it became transparent, then pressed and baked at 2150-2200C for 40 minutes. The authors believe that the use of such protective coatings will aid substantially in the automation of the melting process. Orig. art. has: 5 figures.

ASSOCIATION: none

SUBMITTED: 00

DATE ACQ: 27Mar64

ENCL: 00

SUB CODE: ML

NO REF SOV: 005

OTHER: 000

Card 2/2

L 11302-65 EWG(j)/EWP(e)/EWT(m)/EPF(c)/EPF(n)-2/EPR/EPA(bb)-2/EWP(b) Pr-4/

Ps-4/Pu-4 JD/WW/JG/AT/WH

ACCESSION NR: AP4043919

S/0279/64/000/004/0106/0115

AUTHOR: Samsonov, G. V. (Kiev); Buryakina, A. L. (Kiev);
Strashinskaya, L. V. (Kiev); Pugach, E. A. (Kiev)

TITLE: Interaction of magnesium²⁷oxide and zirconium²⁷dioxide with
refractory compounds¹⁶ at high temperatures in a vacuum

SOURCE: AN BSSR. Izv. Metallurgiya i gornoye delo, no. 4, 1964,
106-115

TOPIC TAGS: refractory oxide²⁷carbide reaction, refractory oxide
nitride reaction, refractory oxide boride reaction, magnesium oxide
carbide reaction, magnesium oxide nitride reaction, magnesium oxide
²⁷boride reaction, zirconium dioxide carbide reaction, zirconium di-
oxide nitride²⁷ reaction, zirconium dioxide boride reaction

ABSTRACT: Contact interaction of MgO and ZrO₂ with TiC, ZrC, HfC,
TaC, Mo₂C, and WC in the 1000—2200C temperature range, and with
TiN, ZrN, TiB₂, and ZrB₂ in the 1000—1800C range has been investi-
gated. Chemically pure MgO and ZrO₂, stabilized with CaO and powders
of the refractory compounds with a composition close to the stoichi-

Card 1/2

L 11302-65

ACCESSION NR: AP4043919

ometric and containing 0.3% max. free C, were used as the initial materials. In the experiments, which were conducted in a vacuum, ZrO_2 powder reacted with compacts of the refractory compounds, and MgO compacts reacted with powders of the refractory compounds. The investigation involved predominantly qualitative aspects of the new phases formed and their microstructure and microhardness. Generally, carbides were the most, and borides the least, stable in high-temperature contact interaction with MgO and ZrO_2 . TaC and HfC in contact with MgO, and TaC and NbC in contact with ZrO_2 reacted only at temperatures higher than 2200C; for ZrC and WC in contact with MgO and for TiC, ZrC, TaC, and WC in contact with ZrO_2 , the temperature of the initial reaction was 2000C. Orig. art. has: 6 figures and 2 tables.

ASSOCIATION: none

SUBMITTED: 29Nov63

ATD PRESS: 3108

ENCL: 00

SUB CODE: MM

NO REF SOV: 006

OTHER: 006

Card 2/2

L 32113-65 EWT(s)/EPA(s)-2/EWT(m)/EPF(c)/EPF(n)-2/EPR/T/EPF(t)/EPA(bb)-2/
EWP(s) Pt-4/Ps-4/Pt-10/Ps-4 IJP(c) JD/WW/JG/AT/WH

ACCESSION NR: AP4046740

S/0226/64/000/005/0016/0021

AUTHOR: Samsonov, G. V.; Yasinskaya, G. A.

TITLE: The interaction of refractory compounds and molten metal

SOURCE: Poroshkovaya metallurgiya, no. 5, 1964, 15-21

TOPIC TAGS: refractory compound, molten metal, acceptor, transition metal,
ionization potential, boride, silicide, carboboride, carbonitride, silicoboride,
aluminum, alkaline earth metal

ABSTRACT: The high resistance of metal-like refractory compounds to the action of molten metals is attributed to the high acceptor ability of the transition metal atom and the low ionization potential of the non-metal atom in these compounds. Furthermore, the authors point out the beneficial effect of the maximum share of covalent bonds between metal and non-metal atoms which does not bring about a conspicuous asymmetry of the electronic density in the crystal lattice of the compounds but the resultant maximum development of structural elements of the non-

Card 1/3

L 32443-65

ACCESSION NR: AP4046740

metal atoms strengthens the lattice. Another favorable factor is the minimum difference in the acceptor ability of the transition metal atoms which are incorporated in the compound and in the melt provided that the refractory compound and the compound are not isomorphous which may occur upon the substitution of the molten metal atoms for the atoms of the refractory compound. The improbability of the formation of a durable chemical bond of the refractory compound atoms with the atoms of the melt, and the minimum acceptor ability with a maximum height of the energetic level of s- or p-electrons of the molten metal are further advantages. These factors make it possible to outline certain possibilities of creating high-melting materials based on metal-like refractory compounds: by increasing the degree of completeness of the d-shell or creating stable sd-hybridized states which results in the formation of solid solutions of isomorphous carbides and nitrides and mixed carbide-nitride solid solutions, by creating complex chemical compounds on a boride and silicide base with the inclusion of s- or p-elements with low energetic levels and valent electrons with low ionization potentials (aluminum, rare earth metals, etc). There is also the possibility of raising the share of covalent bonds by means of combining transition metals with

Card 2/3

L 32443-65

ACCESSION NR: AP4046740

several non-metals (carbaborides, carbonitrides, silicoborides, etc.).

ASSOCIATION: Institut problem materialovedeniya AN UkrSSR (Institute of Material Study Problems, Academy of Sciences UkrSSR)

SUBMITTED: 04 Apr 64

ENCL: 00

SUB CODE: MM

NR REF SOV: 016

OTHER: 000

Card 3/3

L 39466-65 EPF(n)-2/EPH/EWT(m)/EWI(m)/EWP(b)/T/EWA(d)/EWP(e)/EWP(w)/EWP(t) Ps-4/
 Pu-L TJP(c) AT/WH/JD/JG

ACCESSION NR: AP4047876

S/0279/64/000/005/0121/0126

AUTHOR: Sinel'nikova, V.S. (Kiev); Samsonov, G.V. (Kiev); L'vov, S.N. (Kiev)

TITLE: Physical properties of aluminides of transition metals of the fifth group
of the periodic system of elements

SOURCE: AN SSSR. Izvestiya. Metallurgiya i gornoye delo, no. 5, 1964, 121-126

TOPIC TAGS: transition metal aluminide, vanadium aluminide, niobium aluminide, tantalum aluminide, specific electrical resistance, Hall constant, thermal electromotive force, thermal conductivity, magnetic susceptibility, microhardness, work function

ABSTRACT: The specific electrical resistance, Hall constant, thermal- e.m.f., thermal conductivity, magnetic susceptibility, concentration and mobility of current carriers, Wiedemann-Franz ratio, and microhardness were determined at room temperature for the following aluminides: V_3Al , V_5Al_8 , Al_3 , Al_6 , Al_{11} , Nb_4Al , Nb_2Al , $NbAl_3$, $TaAl_3$, Ta_2Al and $TaAl_3$. The work function at 1500 K was determined for $ZrAl_3$, Zr_5Al_8 , V_5Al_8 , $TaAl_3$ and $NbAl_3$. "(Work

Card 1/2

L 39466-65

ACCESSION NR: AP4047876

2

function) Measurements were carried out by B. Ch. Dyubya and O. K. Kultashev"
Orig. art. has: 4 tables .

ASSOCIATION: None

SUBMITTED: 01Feb64

ENCL: 00

SUB CODE: MM

NR REF SOV: 012

OTHER: 009

Card 2/2 6

SAMSONOV, G. V. and

"Nonoxidic refractory materials for high-temperature applications."

(Institute of Powder Metallurgy and Special Alloys, Ukrainian Academy of Sciences).

At the Division of Physical Chemistry and Technology of Inorganic Materials, Acad. Sci. USSR, a scientific council on the problem of silicates has been established. The Council is a coordinating body for basic scientific research on silicates, glass, fiber glass, stoneware, refractory and superrefractory materials, and coatings. The purpose of the Council is primarily to contribute to the improvement of the strength and impact resistance of existing materials. In 1963, the council held two sessions.

(Steklo i keramika, no. 6, 1964, 48-49)

L 23440-65 EWT(m)/EWA(d)/EWP(t)/EWP(b) Pad IJP(c) MJW/JD/HW/JG

ACCESSION NR: AP4043913

S/0136/64/000/008/0079/0082

AUTHOR: Lemikhov, L. K.; Samsonov, G. V.

TITLE: The inoculation of aluminum and alloy "AL 7" with transition metals

SOURCE: Tsvetnyye metally, no. 8, 1964, 79-82

TOPIC TAGS: aluminum alloy, scandium, titanium, zirconium, mercury, chromium, manganese, iron, nickel, rhenium, electron, energetic state, incomplete shell/
AL 7 alloy

ABSTRACT: The authors discuss the effect of certain transition metals on the microstructure of Al and Al alloys in accordance with the chemical composition of a given inoculant. Aluminum (grade AV000) and casting alloy AL 7 (4.5% Cu, 0.8% Fe) were inoculated with 15 transition metals by standard method. The effect of inoculation was evaluated by the number of grains per square centimeter of the surface. Elements at the beginning of periods and whose d-level is most defective proved highly effective inoculants. Thus, Sc is most effective for pure Al, but as the d-level is completed from Sc to Ni, the effect of the inoculant diminishes. The same pattern was observed in elements of other periods. Certain deviations from this pattern was observed when Cr and Mn, which have stable electronic con-

Card 1/2

L 23440-65

ACCESSION NR: 4043913

figurations d_{5s}^- and d_{5s}^2 , were added. The results obtained by the authors for these alloys coincide with earlier findings of other investigators. Like pure Al, alloy AL 7 is not substantially affected by inoculation with Sc, Ti, Zr, and Hf. Metals whose d-shell is filled to a high degree (Cr, Mn, Fe, Co, Ni and Re) are also weak inoculants. The effect of Nb and W was conspicuous. V, Nb, Ta, and W, being average-capacity acceptors, were rather effective. The authors conclude that the effectiveness of inoculation of transition metals may be attributed to the number and energetic state of electrons in the incomplete shells of isolated atoms of these metals. They suggest that this consideration become the basis for a rational theory on the inoculation of Al and its alloys. Orig. art. has: 1 table.

ASSOCIATION: none

SUBMITTED: 00

ENCL: 00

SUB CODE: MM

NO REF SOV: 010

OTHER: 005

Card 2/2

L 16303-65 EWP(e)/EWT(m)/EPF(n)-2/EPR/EWP(t)/EWF(h) Pa-l/Pu-l IJP(c)/AEDC(a)/
ACCESSION NR: AP4045901 SSD/ASD(p)-3 JD/JG/AT/WH S/0021/64/000/009/1175/1177

AUTHOR: Neshpor, V. S.; Samsonov, G. V. (Corresponding member AN UkrSSR)

TITLE: Heat conductivity of scandium nitride

SOURCE: AN UkrRSR. Dopovidi, no. 9, 1964, 1175-1177

TOPIC TAGS: scandium nitride, heat conductivity, scandium nitride heat conductivity, electron heat conductivity, lattice heat conductivity, transition metal heat conductivity

ABSTRACT: The heat conductivity of scandium nitride, $\text{ScN}_{0.98}$, was measured at 298K and found to be 27.0 w/m·deg, a value which well satisfies the Wiedemann-Franz law. Hence, the heat conductivity of scandium nitride is almost wholly effected by free electrons with very little participation of lattice heat conductivity; this conclusion shows the metallic nature of scandium nitride. A similar situation was found to exist in $\text{TiN}_{0.98}$, $\text{ZrN}_{0.98}$, and $\text{HfN}_{0.86}$. However, the theoretical electron heat conductivity of $\text{VN}_{0.93}$, $\text{Ta}_{1.01}$, and $\text{CrN}_{0.93}$ was lower than that found by measurement, which indicated a predominant role of lattice heat conductivity in these compounds. The explanation for the difference is that the ratio of the electron and lattice shares of the heat conductivity of the transition metal nitrides is a function of the acceptor capacity of the d-electron

Card 1/2

L 16303-65

ACCESSION NR: AP4045901

sublevels of the atoms of transition metals. Orig. art. has: 1 table.

ASSOCIATION: Institut problem materialoznavstva (Institute of the Problems of the Science of Materials)

SUBMITTED: 25Jan64

ENCL: 00

SUB CODE: TD, MM

NO REF SOV: 008

OTHER: 002

Card 2/2

L-16289-85 EWT(1)/EWP(e)/EPA(s)-2/ENG(k)/EWI(m)/EPF(c)/EPF(n)-2/ENG(v)/EPR/
EPA(w)-2/EWP(j)/T/EWP(t)/EWP(b) pz-6/Pc-4/Pab-10/Pe-5/Pr-4/ps-4/Pt-10/Pu-4
IJP(c)/AEDC(b)/SSD/AFWL JD/WH/JG/AT/RM/WH

ACCESSION NR: AP4044531

S/0294/6:/002/004/0634/0647

AUTHOR: Stadny*k, B. I.; Samsonov, G. V.

TITLE: Thermocouples for high-temperature measurements

SOURCE: Teplofizika vy*sokikh temperatur, v. 2, no. 4, 1964, 634-647

TOPIC TAGS: thermocouple, noble metal alloy thermocouple, refractory metal alloy thermocouple, thermocouple property, thermocouple insulation material, thermocouple protection material

ABSTRACT: A review of pertinent Soviet and non-Soviet literature and some experimental results are presented on the accuracy, stability and limits of application of existing metallic thermocouples and their high-temperature protective insulation. Thermocouples made of metals and alloys of the platinum group, of which the PR 30/6 thermocouple (Pt with 30% Rh and Pt with 6% Rh) is the most stable, can be successfully used for measuring temperatures up to 1800C in an oxidizing atmosphere. However, they are not recommended for use in a

Card 1/ 3

L 16289-65

ACCESSION NR: AP4044531

hydrogen atmosphere. The thermal emf instability of a thermocouple made of noble metals is caused mainly by contamination of one or both electrodes by impurities, especially iron, from ceramic protective sheaths. Pure dense Al_2O_3 is the best insulator for thermocouples of this group. Thermocouples made of W-Ir and Ir-Ir+60% Rh are good for measuring temperatures up to 2100C, but the high cost and scarcity of Ir restricts their use. Thermocouples made of W-Re alloys can be used to measure temperatures up to 2200C in vacuum, or in neutral or hydrogen medium. They are less susceptible to contamination by impurities than thermocouples of the platinum group. To obtain maximum stability the thermoelectrodes with a high Re content (W-Re--10/20 or W-Re--15/20) are required; this is especially important for use in a hydrogen atmosphere. Large-diameter electrodes should be used for operation in vacuum. The thermocouples can be used as standards at temperatures up to 1960C. Dense, pure Al_2O_3 insulation can be used for W-Re thermocouples for measuring temperatures up to 1950C. MgO insulation can be used up to 2200C. Temperature measurements in a carbon-containing atmosphere can be made

Card 2 / 3

L 16289-65

ACCESSION NR: AP4044531

2
using BeO sheaths. Boron nitride has good insulating properties and is a promising material for high-temperature protection of thermocouples. Orig. art. has: 4 figures and 5 tables.

ASSOCIATION: Konstruktorskoye byuro "Termopribor" (Design bureau "Termopribor"); Institut problem materialovedeniya AN UkrSSR (Institute of the Science of Materials AN UkrSSR)

SUBMITTED: 29Feb64

ENCL: 00

SUB CODE: TD,IE

NO REF SOV: 022

OTHER: 035

Card 3/3

L 15159-65 EWP(e)/EWT(m)/EPF(n)-2/EPR/EWP(t)/EWP(b) Ps-4/Pu-4 IJP(c)/
ESD(gs)/SSD/AFWL/ASD(f)-2/ASD(m)-3/AS(mp)-2/ASD(p)-3/AFMDC AT/WH/WJ/JD/JG

S/0294/64/002/005/0730/0735

ACCESSION NR: AP4047377

AUTHORS: Samsonov, G. V.; Fomenko, V. S.; Paderno, V. N.; Rud', B. M.

TITLE: Thermoemission characteristics of isomorphous carbide alloys

SOURCE: Teplofizika vy'sokikh temperatur, v. 2, no. 5, 1964, 730-735

TOPIC TAGS: heat emission, carbide, alloy, porous material, titanium, niobium, hafnium, zirconium, work function, electron shell, OMP 19A micropyrometer

ABSTRACT: A method for the preparation of homogeneous alloys of different composition and for obtaining compact tablets of isomorphous alloys of TaC-ZrC, TaC-HfC and HfC-NbC has been developed. The thermoemission characteristics of these alloys and their dependence on the concentration were studied in the temperature range of 1100-2500C. The tablets were pressed at 2500-2700C over a period of 5 minutes under a pressure of 300 kg/cm², and were ground and polished to 6 mm in diameter and 0.6-0.7 mm in height. Their residual porosity did not exceed 5-9%. The thermoemission experiment was conducted following the method of V. I. Marchenko, G. V. Samsonov, and V. S. Fomenko (Radiotekhnika i elektronika, 8, 1076, 1963). Temperatures were measured with a micropyrometer OMP-19A. It was found that the thermoemission characteristics of these alloys depended on the

Card 1/2

L 15159-65

ACCESSION NR: AP4047377

electron shell structure of the constituent metal atoms. The work functions of these alloys were shown to be higher than the work functions of the individual carbides because of the strong interactions between the metal atoms. The nature of variation of the thermoemission characteristics of carbide solid solutions was determined from the relationship between the acceptor capacity of the metal atoms and the probability of having a d^5 type electron configuration. Orig. art. has: 6 figures and 1 table.

ASSOCIATION: Institut problem materialovedeniya, Akademii nauk SSSR (Institute of Material Research Problems, Academy of Sciences SSSR)

SUBMITTED: 21Feb64

ENCL: 00

SUB CODE: MM

NO REF SOV: 011

OTHER: 006

Card 2/2

L 25301-65 EWT(m)/EWP(b)/EWP(t) IJP(c) JD
 ACCESSION NR: AP5001592

S/0226/64/000/006/0058/0067 116
 11
 B

AUTHOR: Samsonov, G. V.; Sleptsov, V. M.

TITLE: Production of boron-silicon alloys

SOURCE: Poroshkovaya metallurgiya, no. 6, 1964, 58-67

TOPIC TAGS: boron, silicon, boron alloy, silicon tetraboride, silicon hexaboride, boron silicon solubility

ABSTRACT: Four methods of obtaining boron-silicon alloys have been studied: 1) sintering of boron and silicon powder compacts; 2) melting of boron and silicon compacts in boron-nitride crucibles; 3) hot compacting of silicon and boron powder compacts in graphite dies; and 4) reduction of silicon oxide with boron in a vacuum. The first three methods produced satisfactory results. However, in hot compacting there is a danger of contamination with graphite. X-ray diffraction patterns revealed two compounds, SiB_4 and SiB_6 . Individual phases had the following values of microhardness: silicon, 794 ± 40 dan/mm²; α -phase of a solid solution of boron in silicon, 1060 ± 62 dan/mm²; β -phase (silicon-rich), 1375 ± 99 dan/mm²; γ -phase (SiB_4), 2000 to 2500 dan/mm²; and δ -phase (SiB_6), 3200 to 3500 dan/mm². The thermal emf of boron-silicon alloys is generally lower than that of silicon. H drops to a

Card 1/2

L 25301-65

ACCESSION NR: AP5001592

minimum of 85 $\mu\text{V}/\text{degreeC}$ at 15—25 at% B, rises to 110 $\mu\text{V}/\text{degreeC}$ at 30—40 at% B, and drops again to 57 $\mu\text{V}/\text{degreeC}$ at 75 at% B. The limit of solubility of boron in silicon was 0.81 at% at 25C, 0.92 at% at 1000C, 2.88 at% at 1300C, and 3.6 at% at 1375C (eutectic temperature). The resistivity of boron-silicon alloys decreases with increasing boron content and temperature. Orig. art. has: 6 figures and 4 tables.

[WW]

ASSOCIATION: Institut problem materialovedeniya AN UkrSSR (Institute for the Study of Materials, AN UkrSSR)

SUBMITTED: 18Nov63

ENCL: 00

SUB CODE: MM

NO REF SOV: 005

OTHER: 015

ATD PRESS: 3181

Card 2/2

ACCESSION NR: AP4041575

S/0078/64/009/007/1529/1533

AUTHOR: Lyutaya, M. D.; Samsonov, G. V.; Khorpyakov, O. T.

TITLE: Germanium nitrides

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 7, 1964, 1529-1533

TOPIC TAGS: germanium nitriding, germanium dioxide nitriding, germanium nitride, germanium nitride structure

ABSTRACT: Conditions of synthesis of germanium nitrides have been studied with 99.99% pure germanium and chemically pure germanium dioxide as initial materials. Nitriding was performed in ammonia or nitrogen. Germanium nitride with a composition near the stoichiometric composition of Ge_3N_4 was obtained by nitriding in ammonia a mixture of germanium with ammonium carbonate (added to prevent coking) in a 1:2 ratio. Germanium begins to react with nitrogen at 700—750C; at 870C germanium nitride begins to decompose. Nitriding for 1 hr at 800C yielded a nitride with a nitrogen content of 20.52%, compared to the stoichiometric 20.46%. Satisfactory results were also obtained

Card 1/2

ACCESSION NR: AP4041575

with nitriding of germanium dioxide. Addition of ammonium carbonate to germanium dioxide decreased the reaction temperature to 750C and holding time to 1 hr from 800C and 4 hr without ammonium carbonate. X-ray diffraction analysis of the germanium nitride obtained from germanium and germanium dioxide showed that both have rhombohedral structures with the lattice constant $a = 8.567\text{\AA}$ and $\alpha = 107^\circ 54'$. Germanium nitride is fully resistant to oxidation in air up to 750—800C. In nitrogen it remains stable at temperatures up to 850C. At 900C it decomposes into elements without formation of lower nitrides. Orig. art. has: 2 figures and 6 tables.

ASSOCIATION: Institut metallokeramiki i spetsial'ny*kh splavov AN UkrSSR (Institute of Powder Metallurgy and Special Alloys, AN UkrSSR)

SUBMITTED: 25May63

ATD PRESS: 3065

ENCL: 00

SUB CODE: IC, MM

NO REF SOV: 006

OTHER: 007

Card 2/2

L 8935-65 EWT(m)/EPF(n)-2/EPR/EPF(q)/ENP(b) Pa-4/Pa-4 JD/JG/AT/WH
 ACCESSION NR: AP4044144 S/0126/64/018/002/0187/0192

AUTHOR: Neshpov, V. S.; Samsonov, G. V.

TITLE: Investigation of the structure and some physical properties⁸
 of alloys of isomorphic dicilicides of molybdenum and rhenium

SOURCE: Fizika metallov i metallovedeniye, v. 18, no. 2, 1964,²⁷
 187-192²⁷

TOPIC TAGS: molybdenum dicilicide, rhenium dicilicide, molybdenum
 rhenium dicilicide alloy, alloy structure, alloy heat conductivity,
 alloy electric resistivity

ABSTRACT: A study of sintered MoSi_2 - ReSi_2 alloys showed that the
 alloys form a continuous series of solid solutions with the
 MoSi_2 -type structure. As the ReSi_2 content increases from 0 to 100%,
 the lattice constants decrease continuously: a—from about 3.195 to
 3.135 Å and c—from 3.235 to 3.175 Å. The changes in cell volume and
 and in alloy density follow the Vegard rule with a slight positive
 deviation for MoSi_2 -rich alloys and a slight negative deviation from
 ReSi_2 -rich alloys. An alloy with 50 mol% ReSi_2 has the highest

Card 1/3

L-8935-65

ACCESSION NR: AP4044144

melting temperature, $2200 \pm 50^\circ\text{C}$, and the highest microhardness, $H_u = 1000 \text{ kg/mm}^2$; its oxidation resistance is as high as that of MoSi_2 and ReSi_2 . Both the total and lattice heat conductivity decrease sharply as the ReSi_2 content increases to 50 mol% and then increase again with increasing ReSi_2 content. In general, changes in the total heat conductivity of the alloys are mostly determined by changes in the lattice heat conductivity. With increasing ReSi_2 content the specific resistivity of $\text{MoSi}_2\text{-ReSi}_2$ alloys gradually increases by several orders. This corresponds to a decreased effective concentration and Hall mobility of free charge carriers. With an increase in the Re content in solid solutions of $(\text{Mo}_{1-x}\text{Re})\text{Si}_2$ alloys, the role of holes as free charge carriers is significantly reduced. This is caused by annihilation of drifting holes in the metal-silicon bonds in the investigated solutions during the substitution of Mo atoms by Re atoms which have a higher valence. Orig. art. has: 4 figures.

ASSOCIATION: Sektor tugoplavnikh materialov Instituta problem materialovedeniya AN UkrSSR (Refractory Materials Section, Institute of the Problems of the Science of Materials, AN UkrSSR)

Card 2/3

L 8935-65

ACCESSION NR: AP4044144

SUBMITTED: 05Aug63

ATD PRESS: 3109

ENCL: 00

SUB CODE: MM

NO REF SOV: 015

OTHER: 005

Card 3/3

L 43849-65 EWT(m)/EWP(t)/EWP(b) IJP(c) JD/JG
ACCESSION NR: AP4048780 S/0126/64/018/004/0637/0639

AUTHOR: Ovsiyannikova, I. A.; Vaynshteyn, E. Ye.; Samsonov, G. V.

TITLE: X ray L_{III} absorption spectra of lanthanum and cerium in some of their compounds with nonmetals

SOURCE: Fizika metallov i metallovedeniye, v. 18, no. 4, 1964, 637-639

TOPIC TAGS: x ray absorption spectrum, lanthanum compound, cerium compound, chemical bond, lanthanum carbide, cerium carbide, lanthanum sulfide, cerium sulfide

ABSTRACT: The author has shown in his book (Refractory Compounds of the Rare-Earth Metals with Nonmetals, Moscow, Metallurgizdat, 1964) that the compounds of the rare-earth metals with phosphorus, sulfur, and carbon are characterized by a mixture of different types of chemical bonds, that is, in addition to the ionic type, there are frequently covalent, or metallic interaction between the atoms. In the present work, the x-ray L_{III} absorption spectra of lanthanum and cerium compounds (certain phosphides, sulfides, oxysulfides, and carbides)

Card 1 / 2

L 43849-65

ACCESSION NR: AP4048780

2
were investigated. The spectra were compared with the spectrum of the element in the oxide form. The structure of all these spectra is similar, but the absorption edge is shifted, very little in carbides, much more in sulfides. This is attributed to an increased valence state of the rare-earth metal in transition from a semiconductor to a metallic state. Orig. art. has: 3 figures.

ASSOCIATION: Institut neorganicheskoy khimii SO AN SSSR (Institute of Inorganic Chemistry, SO AN SSSR); Institut metallokeramiki i spetsialnykh splavov AN UkrSSR (Institute of Powder Metallurgy and Special Alloys, AN UkrSSR)

SUBMITTED: 14Feb64

ENCL: 00

SUB CODE: GC, SS

NR REF SOV: 004

OTHER: 000


Card 2/2

L 39935-65 EWT(m)/EWA(c)/EWP(b)/T/EWA(d)/EWP(w)/EWP(t) IJP(c) JD

ACCESSION NR: AP4011972

S/0073/64/030/001/0018/0020

AUTHOR: Samsonov, G. V.; Vereykina, L. L.

21
19

TITLE: Preparation of indium phosphide

5

SOURCE: Ukrainskiy khimicheskiy zhurnal, v. 30. no. 1, 1964, 18-20

TOPIC TAGS: indium phosphide, preparation, indium oxide preparation, indium oxide, phosphidizing, indium phosphide properties, indium phosphide structure

ABSTRACT: Indium phosphide was prepared by reducing indium oxide with phosphine: $\text{In}_2\text{O}_3 + 2\text{PH}_3 = 2\text{InP} + 3\text{H}_2\text{O}$. The indium oxide was prepared by dissolving metallic indium in concentrated HNO_3 , evaporating, drying and decomposing the nitrate at 300°C and calcining at 1000°C . Optimum phosphidizing is at 650°C for 1 - 2 hours with a 3-fold excess of phosphine over the stoichiometric amount. Indium phosphide is a black powder, readily soluble in mineral acids, and has a sphalerite structure, unit cell $a = 5.86$ Angstroms. "Work

Card 1/2

L 39935-65

ACCESSION NR: AP4011972

was carried out with the participation of Yu. B. Titkov "Orig. art. has: 1 table

ASSOCIATION: Institut metallokeramiki i spetsial'ny*kh splavov AN UkrSSR
(Institute of Metalloceramics and Special Alloys, AN UkrSSR)

SUBMITTED: 22 Mar 63

ENCL 00

SUB CODE 11, 30 NO REF SOV 003

OTHER: 004

Card 2/2

ACCESSION NR: AP4021977

S/0073/64/030/002/0143/0146

AUTHOR: Samsonov, G. V.; Verkhoglyadova, T. S.

TITLE: Production of rhenium nitride

SOURCE: Ukrainskiy khimicheskiy zhurnal, v. 30, no. 2, 1964, 143-146

TOPIC TAGS: rhenium nitride, Re_2N , production, rhenium nitriding, superconductor, semiconductor, ammonium perrhenate, x ray analysis, rhenium nitride lattice

ABSTRACT: The conditions were investigated for the production of rhenium nitrides, which are especially interesting because of their superconducting and semiconductor properties and the high ionization potential (14, 51 ev) of the nitrogen atom. Reactions were run with powdered rhenium and ammonium perrhenate with nitrogen and with ammonia in the absence of atmospheric oxygen. The resultant products were subjected to chemical and x-ray analysis. Rhenium and nitrogen heated to 300-800C for 15 and 240 minutes do not form nitrides. Rheni-

Card

1/2

ACCESSION NR: AP4021977

um and ammonia form a product containing some nitrogen at 250C; at 600C the nitrogen content in the product is about 3.5%, approximately equivalent to the formula Re_2N . The nitrogen content is highest after short periods of heating and decreases with prolonged nitriding (250-1200C), e. g. 4.28% in 30 min., reduced to 2.9% in 60 min. at 500C. This may be caused by the original formation of metastable products which gradually change to the stable nitrides. On heating ammonium perrenate with ammonia, nitriding starts at 300C, and the nitrogen content again decreases with prolonged nitriding, e. g. from 7.3% in 1/4 hour to 0.85% in 23 hours. X-ray analysis showed the products ranging from Re_2N to Re_3N have cubic face-centered lattices. This wide range of homogeneity requires further study. Orig. art. has: 2 tables.

ASSOCIATION: Institut metallokeramiki i spetsial'ny*kh splavov AN UkrSSR
(Institute of Metalloceramics and Special Alloys AN UkrSSR)

SUBMITTED: 03Oct63

DATE ACQ: 08Apr 64

ENCL: 00

SUB CODE: IC

NO REF SOV: 006

OTHER: 006

Card

2/2

AP4009931

S/0057/64/034/001/0128/0130

AUTHOR: Marchenko, V.I.; Samsonov, G.V.; Fomenko, V.S.

TITLE: Thermionic emission of praseodymium and neodymium sulfides

SOURCE: Zhurnal tekhnicheskoy fiziki, v.34, no.1, 1964, 128-130

TOPIC TAGS: thermionic emission, rare earth sulfides, work function, thermoelectric emission, praseodymium sulfide work function, neodymium sulfide work function, praseodymium sulfide, neodymium sulfide

ABSTRACT: Because of the importance of compounds of rare earth metals with Group VI elements, the thermoelectric emissions of PrS , Pr_2S_3 , NdS , and Nd_2S_3 were measured at temperatures from 800 to 1500°C. The sesquisulfides were prepared by heating compressed powder pellets in H_2S at 1400°C. The monosulfides were prepared from intermediate products of a reaction discussed elsewhere (S.V.Radzikovskaya, G.V.Samsonov, Ukr.khim.zhurn., 26, 412, 1960). The thermoelectric currents were measured by a procedure described earlier (V.I.Marchenko, G.V.Samsonov, V.S.Fomenko, Radio-tehnika i elektronika, 8, 6, 1067, 1963). From measured saturation currents the work function was obtained as a function of temperature by employing the tables of C.Jansen and R.Loosjes (Phil.Res.Rep., 8, 61, 1953). The work functions of all four com-

Card 1/2

AP4009931

pounds increase approximately linearly with temperature up to about 1400 or 1500°C. At higher temperatures the increase continues, but at a slightly lower rate. Comparison of the present results with similar measurements for lanthanum and cerium sulfides shows that 1) the work functions of the two sulfides of the same metal are close (at a given temperature) and 2) the work function of the sulfide decreases slightly on going from the lanthanum to the cerium to the praseodymium compound. These results are regarded as confirmation of a previous suggestion that the work function is related to the 4f-5d electron transition probability. The work function of neodymium sulfide is slightly greater than that of praseodymium sulfide. Orig.art.has: 5 figures and 1 table.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov AN UkrSSR, Kiev
(Institute of Cermets. and Special Alloys, Academy of Sciences, UkrSSR)

SUBMITTED: 03Nov62

DATE ACQ: 10Feb64

ENCL: 00

SUB CODE: PH

NR REF SOV: 004

OTHER: 001

Cord 2/2

s/0080/64/037/008/1828/1830

ACCESSION NR: AP4043769

AUTHOR: Dubovik, T. V.; Polishchuk, V.S.; Samsonov, G. V.

TITLE: Derivation of magnesium nitride

SOURCE: Zhurnal prikladnoy khimii, v. 37, no. 8, 1964, 1828-1830

TOPIC TAGS: magnesium, nitride, nitration agent, ammonia, nitrogen

ABSTRACT: The authors conduct a technological study of conditions for obtaining magnesium nitride using nitrogen and ammonia as nitration agents. The initial material consisted of magnesium chips measuring 0.1-0.2 mm. Nitration took place in porcelain vessels placed in a quartz reactor. Nitration was conducted at temperatures from 200 to 1000°C over a period of 15 minutes to 4 hours for each temperature. The results of the experiment showed that nitration begins during the distillation of nitrogen through magnesium over a period of 30 minutes at 250°C. Nitration reaches its peak at 800°C over a period of 4 hours. At higher temperatures the nitrogen content drops sharply. The authors concluded that attempts to nitrate magnesium with ammonia have yielded much poorer results, which is apparently related to the fact that magnesium nitride converts easily into hydride and

Card 1/2

ACCESSION NR: AP4043769

visa versa. Orig. art. has: 2 figures and 1 table.

ASSOCIATION: none

SUBMITTED: 04Oct62

ENCL: 00

SUB CODE: IC, MT

NO REF SOV: 001--

OTHER: 009

Card 2/2